

Superfund Records Center  
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# Five-Year Review Report

Second Five-Year Review Report  
for  
The South Municipal Water Supply Well Superfund Site  
Town of Peterborough  
Hillsborough County, New Hampshire

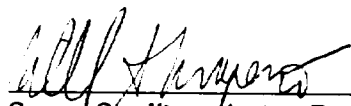
June 2003

Prepared by:  
The United States Environmental Protection Agency  
Region 1, New England  
Boston, Massachusetts



Approved by:

Date:

*for*   
Susan Studlien, Acting Director  
Office of Site Remediation and Restoration  
U.S. EPA, New England

*June 2, 2003*

## Five-Year Review Summary Form

### SITE IDENTIFICATION

**Site name:** South Municipal Water Supply Well

**EPA ID:** NHD980671069

**Region:** 1

**State:** New Hampshire

**City/County:** Peterborough/Hillsborough

### SITE STATUS

**NPL status:** ☒ Final ☐ Deleted ☐ Other (specify) \_\_\_\_\_

**Remediation status** (choose all that apply): ☐ Under Construction ☐ Operating ☒ Complete

**Multiple OUs?** ☐ YES ☒ NO

**Construction completion date:** December 15, 1994

**Has site been put into reuse?** ☐ YES ☒ NO, continues as an industrial facility

### REVIEW STATUS

**Lead agency:** ☒ EPA ☐ State ☐ Tribe ☐ Other Federal Agency \_\_\_\_\_

**Author name:** Roger Duwart

**Author title:** Remedial Project Manager

**Author affiliation:** U.S. EPA, Region 1

**Review period:** March 26, 2003 through May, 2003

**Date of site inspection:** March 26, 2003

**Type of review:**

- ☒ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only  
☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead  
☐ Regional Discretion

**Review number:** ☐ 1 (first) ☒ 2 (second) ☐ 3 (third) ☐ Other (specify) \_\_\_\_\_

**Triggering action:**

- ☐ Actual RA Onsite Construction at OU # \_\_\_\_\_ ☐ Actual RA Start at OU# \_\_\_\_\_  
☐ Construction Completion ☒ Previous Five-Year Review Report  
☐ Other (specify) \_\_\_\_\_

**Triggering action date:** June 2, 1998

**Due date:** June 2, 2003

## **Five-Year Review Summary Form, cont'd.**

### **Issues:**

Maintenance of extraction wells EX-4 and EX-10 requires continuous attention.

Low levels of VOCs persist in the aquifer at the leading edge of the plume.

### **Recommendations and Follow-up Actions:**

The preventive maintenance schedule has been developed for the extraction wells. This must be implemented prior to reactivation of the South Well.

Pumping of EX-5A should enable the cleanup levels to be met at the leading edge of the plume, but this pumping must continue for longer than originally predicted. Monitoring of ground water quality and water levels will continue in order to better understand the reasons for this persistence. Ground water monitoring should continue on a quarterly basis for wells near EX-5A and annually for all wells.

### **Protectiveness Statement:**

Because the remedial actions being implemented throughout the South Municipal Water Supply Well Superfund Site are protective, the site is protective of human health and the environment.

## Table of Contents

<b>I.</b>	<b>Introduction</b>	<b>1</b>
<b>II.</b>	<b>Site Chronology</b>	<b>2</b>
<b>III.</b>	<b>Background</b>	<b>2</b>
	<b>A. Physical Characteristics</b>	<b>2</b>
	<b>B. Land and Resource Use</b>	<b>3</b>
	<b>C. History of Contamination</b>	<b>3</b>
	<b>D. Bases for Taking Action</b>	<b>4</b>
<b>IV.</b>	<b>Remedial Actions</b>	<b>4</b>
	<b>A. Remedy Selection</b>	<b>4</b>
	<b>B. Remedy Implementation</b>	<b>6</b>
	<b>C. System Operations/Operation and Maintenance (O&amp;M)</b>	<b>7</b>
<b>V.</b>	<b>Progress Since the Last Five-Year Review</b>	<b>8</b>
<b>VI.</b>	<b>Five-Year Review Process</b>	<b>8</b>
	<b>A. Administrative Components</b>	<b>8</b>
	<b>B. Community Involvement</b>	<b>9</b>
	<b>C. Document Review</b>	<b>9</b>
	<b>D. Data Review</b>	<b>9</b>
	<b>E. Site Inspection</b>	<b>9</b>
	<b>F. Interviews</b>	<b>10</b>
<b>VII.</b>	<b>Technical Assessment</b>	<b>10</b>
	<b>A. Is the remedy functioning as intended by the decision documents?</b>	<b>10</b>
	<b>B. Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of remedy selection still valid?</b>	<b>10</b>
	<b>C. Has any other information come to light that could call into question the protectiveness of the remedy?</b>	<b>11</b>
<b>VIII.</b>	<b>Issues</b>	<b>11</b>
<b>IX.</b>	<b>Recommendations and Follow-up Actions</b>	<b>12</b>
<b>X.</b>	<b>Protectiveness Statement</b>	<b>12</b>
<b>XI.</b>	<b>Next Review</b>	<b>12</b>

## **Attachment A - Documents Reviewed**

### **Figures and Tables**

**Figure 1 - Capture Zone for EX-4**

**Figure 2 - TI Waiver Boundary (“Waiver Area”)**

**Table 1 - Chronology of Site Events**

**Table 2 - Cleanup Goals and Results**

**Table 3 - Summary of Ground Water Treated**

**Table 4 - Summary of VOCs Removed**

## **South Municipal Water Supply Well Superfund Site Second Five-Year Review Report**

### **I. Introduction**

The purpose of a five-year review is to determine whether a remedy at a Superfund site is protective of human health and the environment. The methods, findings and conclusions of reviews are documented in five-year review reports. In addition, five-year review reports identify issues found during the review, if any, and recommendations to address them.

The U.S. Environmental Protection Agency (EPA) New England must implement five-year reviews consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA Section 121(c) states:

*If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented.*

EPA interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

*If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the selected remedial action.*

Due to the fact that wastes are still contained on a portion of the site and the ground water is still being treated outside of that area, EPA has conducted this second five-year review of the remedial actions implemented at the South Municipal Water Supply Well Superfund Site in Peterborough, New Hampshire. The review was conducted from March through May, 2003. This report documents the results of the review. The trigger for this statutory review is the signature date of the initial five-year review, June 2, 1998.

## II. Site Chronology

The chronology of events for the South Municipal Water Supply Well Superfund Site is presented in Table 1, below:

**Table 1: Chronology of Site Events**

Date	Event
October, 1982	Discovery of the problem
December, 1982	South Municipal Water Supply Well shut down
September 21, 1984	Final listing on NPL
September 27, 1989	RI/FS complete
September 27, 1989	ROD signature
July 9, 1990	Effective date of Unilateral Order to New Hampshire Ball Bearings, Inc. to implement remedy
May 6, 1993	ESD addressing air emission controls and sediment excavation
June 7, 1993	Construction start
March 12, 1994	Start of ground water treatment plant operation
December 15, 1994	Construction completion (wetlands restored)
February 3, 1997	ESD addressing technical impracticability waiver resulting in elimination of need for several extraction wells and soil vapor extraction
June 2, 1998	First five-year review report
November 17, 1998	Extraction well (EX-7) in dilute plume shut down
May 16, 2002	EX-10 began operation

## III. Background

### A. Physical Characteristics

The South Municipal Water Supply Well Superfund Site (the site) is located approximately two miles south of the center of the Town of Peterborough in Hillsborough County, New Hampshire. The South Well, situated at the edge of the Site, is located on Sharon Road, approximately 350 feet east of the Contoocook River. The site area is

approximately 250 acres.

Two major surface-water environments, the Contoocook River/Noone Pond system, and a wetlands area, are present at the site. The river and wetlands area are fed by two small unnamed creeks located east and north of the New Hampshire Ball Bearings, Inc. (NHBB) plant.

## **B. Land and Resource Use**

Land use in the vicinity of the site, particularly east of the river, is rural and undeveloped. A plumbing business and several apartments are situated on the property adjacent to, and south of, the well. Approximately 1,000 feet north of the well and west of the river are an automobile dealership and several commercial establishments. NHBB, a manufacturer of precision ball bearings, is located approximately 1,200 feet west of the South Well.

The site and adjacent area are served by a municipal water system which receives water from three wells located north of the town center. The closest residential wells are located approximately one-half mile north and upgradient of the site. A private bottled water company is drawing ground water from a well located several hundred feet south of the South Well. The South Well was installed in 1952 and provided water to the town of Peterborough for thirty years.

The site is situated in the Contoocook River Valley, on glacial/fluviial deposits approximately 20 to 90 feet in thickness. Deposits are predominantly sands and gravels, although silty layers are found dispersed both vertically and horizontally about the site area. The general direction of ground water flow is east-northeast in the vicinity of the NHBB plant and changes to a northerly direction at the Contoocook River, paralleling the river. The ground water velocities are high, since the media is coarse and the gradients large.

## **C. History of Contamination**

On October 22, 1982, the New Hampshire Water Supply and Pollution Control Commission (now the New Hampshire Department of Environmental Services) found over 100 parts per billion (ppb) of total volatile organics in a sample of water from the well. At the recommendation of the U.S. Environmental Protection Agency (EPA) and the state, the town of Peterborough discontinued the use of the well. Subsequent investigations determined that solvent use and disposal at the NHBB facility had resulted in a plume of contaminated ground water extending from under the NHBB property to the vicinity of the South Well. The principal solvents NHBB had used and found in the ground water were tetrachloroethylene, trichloroethylene, and 1,1,1-trichloroethane.

## **D. Bases for Taking Action**

Two media were found to have contaminants which posed unacceptable risks to public health and the environment: ground water containing volatile organic solvents and wetland sediments located on the NHBB property containing polychlorinated biphenyls and polyaromatic hydrocarbons. The principal threats were from ingestion of contaminated ground water and direct contact and incidental ingestion of contaminated sediments.

## **IV. Remedial Actions**

### **A. Remedy Selection**

The remedial action objectives which were presented in the Record of Decision (ROD) issued September 27, 1989 were to:

- L** Eliminate or minimize, to the maximum extent practicable, the threat posed to the public health, welfare, and environment by the current extent of contamination for groundwater, soils, and sediments;
- L** To eliminate or minimize the migration of contaminants from the soils into the ground water; and
- L** To meet federal and state Applicable or Relevant and Appropriate Requirements (ARARs).

To meet these objectives, the ROD included the following components:

- K** Groundwater Extraction and Treatment with Air Stripping and Carbon Columns for Air Emission Control
- K** In-Situ Vacuum Extraction of Contaminated Soils
- K** Excavation and/or Dredging with Dewatering of Sediments and Off-Site Disposal
- K** Wetlands Restoration
- K** Long-Term Environmental Monitoring
- K** Institutional Controls

Between July 1990, and January 1993, extensive pre-design investigations were undertaken and the design of the remedy finalized. As a result of having obtained more detailed technical information during these pre-design investigations, an ESD was issued on May 6, 1993, which documented modifications to the remedy principally for air emission controls and sediment excavation.

The ground water extraction and treatment system has been in operation since March of 1994 and the vacuum extraction system began operation in October of 1994. After reviewing quarterly ground water sampling data over the first two years of remedial actions and considering the changes which occurred since the ROD was issued concerning understanding the difficulties of restoring ground water contaminated with dense non-aqueous phase liquids (DNAPLs), EPA determined that it was technically impracticable, from an engineering perspective, to restore that portion of the contaminated ground water affected by Dense Non-Aqueous Phase Liquids (DNAPLs) to drinking water quality in a reasonable time frame. Therefore, a second ESD was issued on February 3, 1997 which documented EPA's decision to waive certain Federal Drinking Water Standards which are applicable or relevant and appropriate requirements (ARARs) for ground water. This ESD eliminated the need to meet the remedial action objective dealing with soil contamination. Since no soil contact threat had been identified, soil vapor extraction had been selected solely to eliminate or minimize the migration of contaminants from the soils into the ground water. Because the issuance of the ESD resulted in the waiver of ground water ARARs near the NHBB facility, there was no need to eliminate or minimize migration of contaminants from the soil to the ground water so vacuum extraction was discontinued. As shown on Figure 2, the "waiver area" includes the NHBB property from 50 feet west of the centerline of Route 202 and to the north of a line running from the entrance to the parking lot to just south of well EM-107. The waiver applies to both the overburden aquifer and the bedrock aquifer beneath it. Because of the determination of technical impracticability, three elements of the remedy were modified by this ESD:

#### *Groundwater Extraction and Treatment*

Air Sparging - The ROD stated that it might be necessary to implement technologies to enhance contaminant removal and to address the presence of free phase solvents in the saturated zone of the NHBB area plume. Air sparging (in conjunction with the soil vacuum extraction system) was the selected technology. Because of technical problems encountered in implementing the air sparging system, it was never operated.

Ground Water Extraction - The ROD specified that the ground water extraction system for the NHBB area would be designed to create a hydraulic barrier between the NHBB area plume and the rest of the aquifer. Since ARARs were waived, the pumping rates and the extraction well configuration was changed to maintain the hydraulic barrier between the NHBB area plume and the rest of the aquifer, but not to attempt to restore the NHBB area plume to drinking water quality.

### *In-Situ Vacuum Extraction of Contaminated Soils*

Since no soil contact threat was identified, the ROD prescribed a vacuum extraction system (VES) to remediate soils located near the corner of the New Hampshire Ball Bearings, Inc. facility solely to allow attainment of ground water cleanup levels. Therefore, since as described above, air sparging was not used and the ground water ARARs were waived, vacuum extraction is no longer being operated.

## **B. Remedy Implementation**

A Unilateral Administrative Order for the design, construction, operation and maintenance of the remedy became effective on July 9, 1990. NHBB, the party potentially responsible for the contamination, completed the design of the remedy which was approved by EPA on May 3, 1993. Construction began on June 7, 1993. The ground water extraction and treatment system began operation in March of 1994 and has operated since then. The vacuum extraction system began operation in October of 1994 but ceased operation when the decision to issue the second ESD was made. All sediments were removed and disposed of at a secure landfill operating in compliance with RCRA. A pre-final inspection was held on September 27, 1994, with a follow-up inspection held October 20, 1994, to ensure completion of the sediment removal and backfilling. Backfilling with enriched, hydric soils and replanting was completed November 5, 1994.

Monitoring of ground water quality and water levels has continued throughout the remedial design, construction and post-construction phases. In the fall of 1998, an analysis of the data indicated that cleanup levels had been achieved and maintained for the previous three years in that portion of the dilute plume being captured by extraction well EX-7 located between Route 202 and the Contoocook River. As a result, EX-7 was turned off and that portion of the aquifer, from just east of Route 202 to just west of EX-5A has continued to meet the cleanup levels without the use of EX-7.

Ground water monitoring data indicates that the cleanup of the ground water outside the “waiver area” is progressing somewhat slower than anticipated and the ground water within the “waiver area” is being contained through pumping and treatment. The cleanup goals for ground water, developed in response to the first remedial action objective, along with the maximum levels of contaminants found in monitoring wells outside the “waiver area” are presented in Table 2, below.

**Table 2: Cleanup Goals and Results**

Contaminant	Target Level (ppb)	1998-2002 Maximum/Well No.	Most Recent Maximum/Well No.
Tetrachloroethylene (PCE)	5	34 ppb/EX-5A	34 ppb/EX-5A
1,1,1-Trichloroethane (TCA)	200	26 ppb/EX-5A	26 ppb/EX-5A
Trichloroethylene (TCE)	5	27 ppb/EX-5A	27 ppb/EX-5A
1,1-Dichloroethylene (DCE)	7	5 ppb/EX-5A	5 ppb/RP-1
Toluene	2000	less than 2 ppb/RP-1	less than 2 ppb/EX-5A
1,1-Dichloroethane (DCA)	810	9 ppb/EX-5A	4 ppb/RP-1
Vinyl Chloride	2	less than 2 ppb/RP-1	less than 2 ppb/EX-5A

### C. System Operations/Operation and Maintenance (O&M)

There are two principal aspects to the O&M for this remedy: ground water treatment facilities O&M and extraction well O&M.

The ground water treatment plant has treated more than 1.3 billion gallons of ground water since it began operation in March of 1994. In the past five-year period only about 382 million gallons have been treated, the result of several wells no longer being used. Currently the average flow is approximately 150 gpm. The treatment medium is cleaned using asceic acid in accordance with the O&M Plan. This maintenance is performed whenever the extraction wells are cleaned and no less often than yearly. Air stripping efficiencies are generally 90% or better for PCE, TCE and TCA. Tables 3 and 4 present annual and cumulative gallons of ground water treated and amounts of volatile organic compounds (VOCs) removed, respectively.



There are currently three groundwater extraction wells operating at the site. EX-4 and EX-10 are located on NHBB property and are pumped to contain contaminated ground water within the “waiver area” on NHBB property. Clogging problems in EX-4 resulted in the installation of EX-10. With both wells pumping (total flow in excess of 100 gpm), containment is ensured. In the past, low yield and/or excessive drawdown in EX-4 has been the signal to clean the well. With the development of an agreement between NHBB and the town to reactivate the South Well, new procedures are being put in place to have preventive maintenance done at prescribed times to avoid shut downs during periods of high water demand.

The third extraction well, EX-5A is located at the leading edge of the ground water contamination, east of Sharon Road. After an extended evaluation period during which the well was not being used, it has been reactivated in order to remove the contamination for treatment at the treatment plant. The pumping rate is in excess of 50 gpm.

## **V. Progress Since the Last Five-Year Review**

The last five-year review contained two recommendations for ensuring the protectiveness of the remedy. The status of their implementation is presented below:

*The periodic ground water monitoring should continue in order to ensure the containment of the “waiver area” ground water and to monitor the progress of the cleanup of the ground water outside of the “waiver area.”*

The periodic monitoring has continued and assessment of the data has resulted in confirmation that ground water above cleanup levels is being contained on the NHBB property. Furthermore, because continuing monitoring outside the “waiver area” has shown cleanup levels to have been achieved over much of the aquifer, extraction and treatment have been discontinued in a large portion of the plume.

*The potential for ground water development should continue to be monitored to ensure that institutional controls remain effective and that adjustments to the ground water extraction system are made, if necessary.*

EPA, NHDES, NHBB and the town of Peterborough have been working closely and cooperatively to address the town’s water supply needs while maintaining the protectiveness of the remedy at the site. The town’s aquifer protection overlay district resulted in the involvement of EPA and NHDES in reviewing and ensuring that a private water supply development located near the site would not compromise the protectiveness of the remedy. As the town continues to investigate its water supply options, NHBB, NHDES, and EPA are working cooperatively to ensure a safe water supply.

## **VI. Five-Year Review Process**

### **A. Administrative Components**

The South Municipal Water Supply Well Superfund Site five-year review was conducted by Roger Duwart, the EPA Remedial Project Manager, with assistance from Thomas Andrews, NHDES Remedial Project Manager. NHBB provided figures, tables and charts for data presentation.

## **B. Community Involvement**

Copies of the review are being placed in the information repositories, including the Peterborough Public Library, and sent to the Town.

## **C. Document Review**

This five-year review consisted of a review of relevant documents including annual reports produced by NHBB, monitoring data and ARARs. The documents reviewed are presented in Attachment A.

## **D. Data Review**

Review of records and monitoring reports through April of 2003, indicates that the remedy is performing as designed.

For the site, seven ground water Chemicals of Concern were identified and had cleanup levels set. Twelve compliance wells (monitoring wells and extraction well EX-5A located outside of the “waiver area”) were sampled in the latest ground water sampling round for which data is available (July, 2002). Only two Chemicals of Concern did not meet their specified cleanup levels. The PCE MCL of 5 ppb was exceeded in EX-5A and in RP-1 and the TCE MCL of 5 ppb was exceeded in only EX-5A. It should be noted, however that these exceedances occurred during the investigation of the persistent VOC contamination and EX-5A was not operating. In the previous sampling round that EX-5A was operational (September 21, 2000), PCE and TCE were exceeded only in RP-1.

A review of water level data shows that EX-4 and EX-10 are containing all contamination inside the “waiver area” on NHBB property. Modeling results have predicted that with the South Well operating, containment can still be achieved.

## **E. Site Inspection**

Representatives of EPA, NHDES, and NHBB participated in the site inspection held on, March 26, 2003. During the inspection, the restoration of the wetland was assessed, the operation of the ground water extraction and treatment system was reviewed, and the ground water monitoring wells were observed. No problems were observed.

In addition, an inspection of the deed to the NHBB property available at the web site of the Hillsborough County Registry of Deeds, confirmed that a restriction on the use of site ground water is in place. The aquifer protection zoning overlay district established by the town of Peterborough which restricts ground water use throughout the site, was reviewed on the Peterborough web page.

## **F. Interviews**

Patricia Carrier, Facilities/Environmental Manager for NHBB, was contacted by phone on April 23, 2003, and also attended the site inspection. She indicated that maintenance of the waiver area extraction wells is an on-going issue. The company is pursuing alternatives to deal directly with the source of contamination in order to minimize the need for ground water extraction and treatment. The company also continues to work closely with Peterborough officials as they investigate water supply alternatives in the vicinity of the South Well.

Ed Betz, the town of Peterborough's Director of Public Works, was contacted by phone on April 24, 2003, and indicated that the town and NHBB had reached agreement on procedures to be followed to allow for the testing of the South Well, in anticipation of its reactivation.

## **VII. Technical Assessment**

### **A. Is the remedy functioning as intended by the decision documents?**

Yes. The combination of extraction wells EX-4 and EX-10 are containing all of the contamination in the "waiver area" (See Figure 1). A large portion of the site ground water has been meeting cleanup levels since 1995, well ahead of projections. A small portion of the aquifer near the leading edge of the contaminated plume has not reached cleanup levels as soon as anticipated. This residual, recalcitrant contamination is of small areal extent and is being adequately addressed by operating EX-5A. Moreover, the ultimate goal of the remedy, to restore the use of the aquifer for water supply purposes, is coming closer to being achieved. Through the combined efforts of NHBB, the town of Peterborough and the NHDES, efforts are well underway to enable reactivation of the South Well in the near future. A long term pump test has been approved and will begin in the summer of 2003.

### **B. Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of remedy selection still valid?**

There have been no changes in land use at the site which would change the exposure assumptions contained in the ROD. The re-use of the South Well aquifer remains a viable option, but the remedy was designed for that eventuality.

The following applicable or relevant and appropriate requirements (ARARs) were reviewed for changes that could affect protectiveness:

- Safe Drinking Water Act (40 CFR Part 141)
- Resource Conservation and Recovery Act (40 CFR 264)
- Clean Water Act (40 CFR 122)
- New Hampshire Code of Administrative Rules Env-Wm 1403 (formerly Env-Ws 410)

The bases for two of the ground water cleanup levels have changed. The ROD set the cleanup level for toluene at 2000 ppb, the proposed Maximum Contaminant Level (MCL) at the time. Subsequently, the MCL was promulgated at 1000 ppb. Because toluene is not now being detected at the site at greater than 2 ppb, the remedy remains protective and is in compliance with ARARs.

The other compound for which the basis of the cleanup level has changed is 1,1-dichloroethane. The cleanup level, 810 ppb, was the result of a New Hampshire consumption advisory for water supplies. This level has been lowered to 81 ppb and promulgated as an Ambient Ground Water Quality Standard. Since less than 9 ppb are being detected at the site, the remedy remains protective and is in compliance with ARARs.

No other ARARs or TBCs were changed which would affect the protectiveness of the remedy.

**C. Has any other information come to light that could call into question the protectiveness of the remedy?**

No. Currently a small portion of the aquifer near EX-5A exceeds the ROD target cleanup levels. Although pumping has been required longer than originally predicted, the remedy remains protective and functioning as intended.

Recent information indicates that a compound, 1,4-dioxane, was routinely added to TCA in order to stabilize it. Since TCA was used at the site and is found in site ground water, future ground water monitoring will include analyses for 1,4-dioxane. However, because 1,4-dioxane is soluble in water and very mobile, it is unlikely that concentrations which could pose a threat to human health or the environment currently exist.

No other information has come to light in the course of this review which could call into question the protectiveness of the remedy.

## **VIII. Issues**

Maintenance of extraction wells EX-4 and EX-10 is an issue that requires continuous attention. A regular preventive maintenance schedule has been developed in conjunction with the agreement between the town of Peterborough and NHBB for the reactivation of the South Well.

Low levels of VOCs persist in the aquifer at the leading edge of the plume. Pumping of EX-5A should enable the cleanup levels to be met, but this pumping must continue for longer than originally predicted. Monitoring of ground water quality and water levels will continue in order to better understand the reasons for this persistence.

Neither issue identified during this review would call into question the protectiveness of the remedy.

## IX. Recommendations and Follow-up Actions

The preventive maintenance schedule has been developed for the extraction wells. This must be implemented prior to reactivation of the South Well.

Pumping of EX-5A should enable the cleanup levels to be met, but this pumping must continue for longer than originally predicted. Monitoring of ground water quality and water levels will need to continue in order to better understand the reasons for this persistence. Ground water monitoring should continue on a quarterly basis for wells near EX-5A and annually for all other wells.

Recommendations/ Follow-up Actions	Party Responsibl e	Oversight Agency	Milestone Date	Follow-up Actions: Affects Protectiveness (Y/N)	
				Current	Future
Implement preventive maintenance schedule for extraction wells	NHBB	EPA/NHDES	Prior to South Well reactivation, then semi-annually	N	N
Monitor ground water quarterly for for wells near EX-5A and annually for all other wells, include analyses for 1,4-dioxane	NHBB	EPA/NHDES	quarterly/annually	N	N

## X. Protectiveness Statement

Because the remedial actions being implemented throughout the South Municipal Water Supply Well Superfund Site are protective, the site is protective of human health and the environment.

## XI. Next Review

This is a statutory site that requires continuing five-year reviews. The next review will be issued either on or prior to five years from the date of signature of this report.

**ATTACHMENT A**

**DOCUMENTS REVIEWED**

“Annual Ground-Water Monitoring Report, Year Five for the South Municipal Water Supply Well Superfund Site,” Hull & Associates, Inc., September 1999.

“Annual Ground-Water Monitoring Report, Year Six for the South Municipal Water Supply Well Superfund Site,” Hull & Associates, Inc., June 2000.

“Annual Ground-Water Monitoring Report, Year Seven for the South Municipal Water Supply Well Superfund Site,” Hull & Associates, Inc., August 2001.

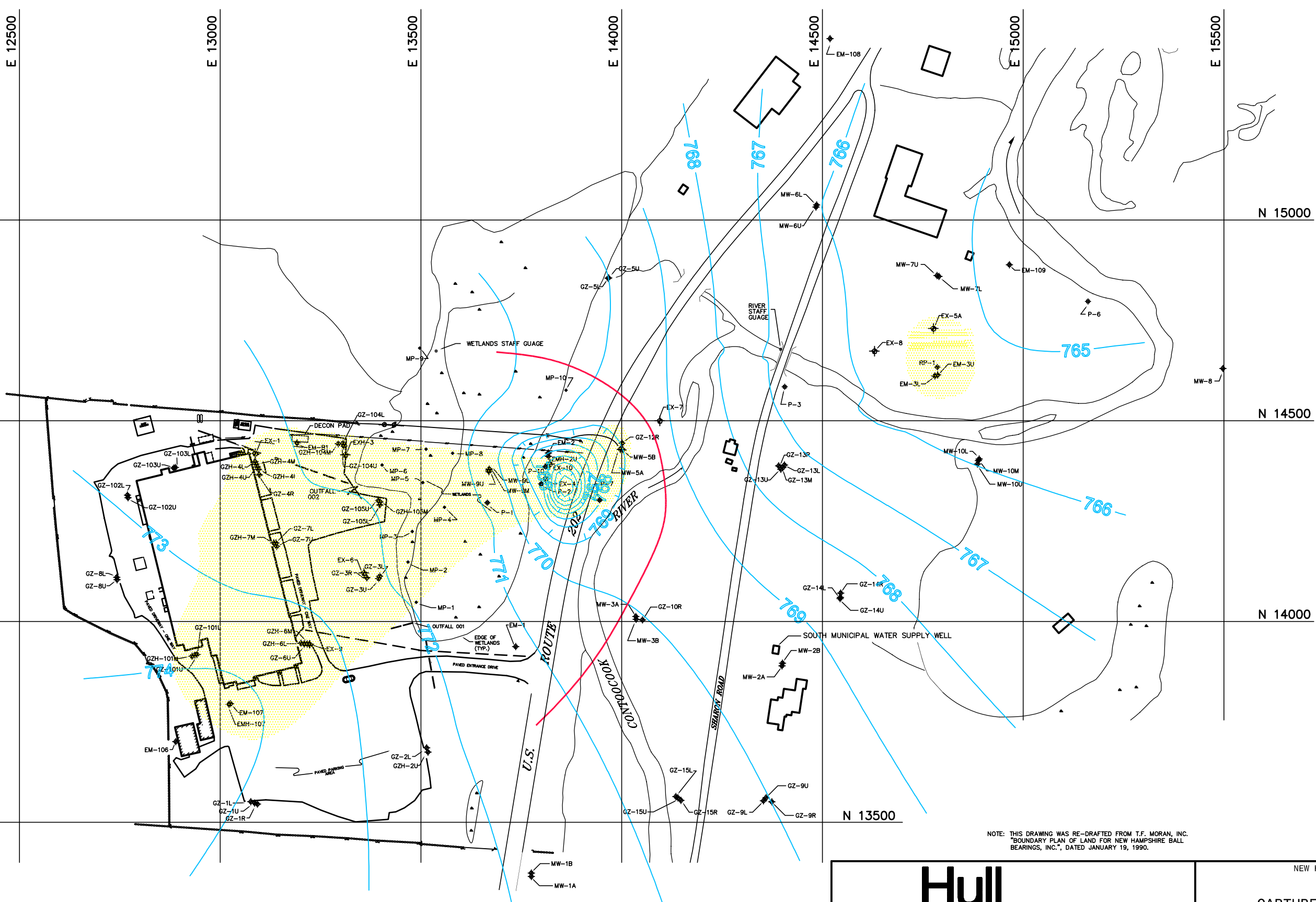
Letter “Report Summarizing Findings from the Investigation of Persistent Volatile Organic Compound Concentrations Near the End of the Plume,” W. Lance Turley, Hull and Associates to Roger Duwart, EPA, November 29, 2001.

“Annual Ground-Water Monitoring Report, Year Eight for the South Municipal Water Supply Well Superfund Site,” Hull & Associates, Inc., August 2002.

Letter “Report Summarizing the Most Recent Findings from the Investigation of Persistent Volatile Organic Compound Concentrations Near the End of the Plume,” W. Lance Turley, Hull and Associates to Roger Duwart, EPA, April 9, 2003.

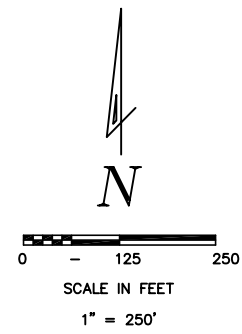
“EX-5A Investigation Summary Report,” Hull & Associates, Inc., April 2003.

“Annual Ground-Water Monitoring Report, Year Nine for the South Municipal Water Supply Well Superfund Site,” Hull & Associates, Inc., May 2003.



- LEGEND:**
- GROUND-WATER EXTRACTION WELL
  - GROUND-WATER MONITORING WELL
  - PIEZOMETER
  - MINI-PIEZOMETER
  - VOCs ABOVE CLEANUP LEVELS  
JUNE 2002 SAMPLING EVENT
  - EQUIPOTENTIAL LINE
  - CAPTURE ZONE

- NOTES:**
- EX-1 OFF
  - EXH-3 OFF
  - EX-4 PUMPING AT 78 GPM
  - EX-5A OFF
  - EX-6 OFF
  - EX-7 OFF
  - EX-9 OFF
  - EX-10 PUMPING AT 26 GPM



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NEW HAMPSHIRE BALL BEARINGS, INC	
FIGURE 1	
CAPTURE ZONE FOR EX-4 BASED ON PIEZOMETRIC DATA COLLECTED ON MARCH 10, 2003 (MIDDLE WELLS)	
PETERBOROUGH, NEW HAMPSHIRE	
PROJECT NO.: NHB026	SUBMITTAL DATE: MAY 2003
CAD DWG FILE: NHB026.200.0002	PLOT DATE: 5/2/03

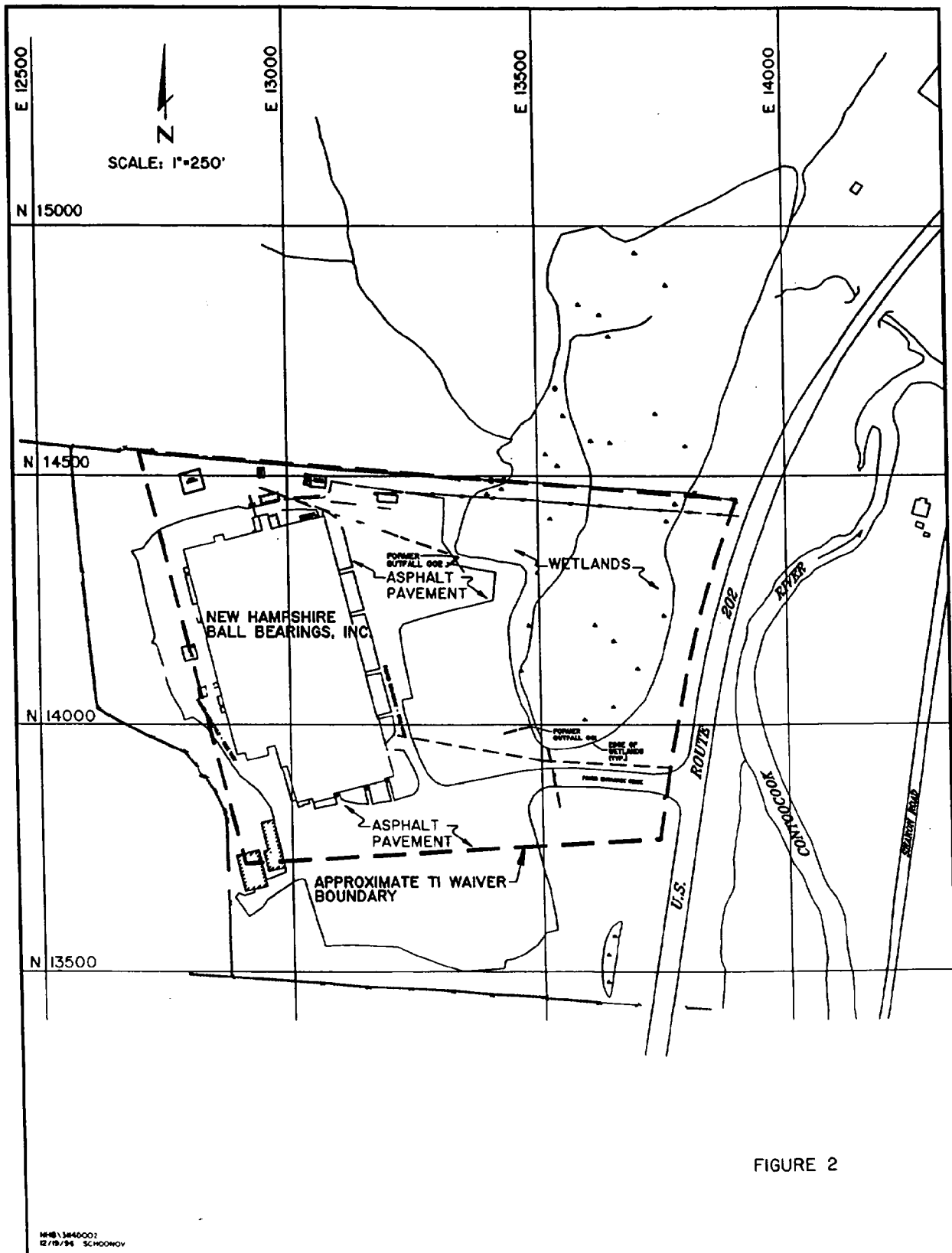


FIGURE 2

**TABLE 3**

**SUMMARY OF ANNUAL AND CUMULATIVE GALLONS OF GROUND WATER TREATED OVER NINE YEARS**

Operational Year	Groundwater Treated (gallons) <sup>1</sup>								Annual Totals
	EX-1	EXH-3	EX-4	EX-5A	EX-6	EX-7	EX-9	EX-10	
Year 1	45,328,270	36,160,754	90,147,232	24,527,124	4,625,280	50,421,334	13,751,272	-- <sup>2</sup>	264,961,266
Year 2	46,641,744	38,868,120	78,772,723	30,873,744	3,071,606	54,543,614	11,919,557	-- <sup>2</sup>	264,691,108
Year 3	49,046,469	38,872,115	78,322,179	27,512,532	2,955,291	59,406,360	9,075,745	-- <sup>2</sup>	265,190,691
Year 4	14,754,643	11,767,133	89,728,119	14,646,580	18,077,486	37,848,719	2,758,874	-- <sup>2</sup>	189,581,554
Year 5	-- <sup>2</sup>	-- <sup>2</sup>	91,221,349	13,907,376	-- <sup>2</sup>	36,003,600	-- <sup>2</sup>	-- <sup>2</sup>	141,132,325
Year 6	-- <sup>2</sup>	-- <sup>2</sup>	71,507,223	18,282,996	-- <sup>2</sup>	-- <sup>2</sup>	-- <sup>2</sup>	-- <sup>2</sup>	89,790,219
Year 7	-- <sup>2</sup>	-- <sup>2</sup>	56,678,076	10,825,783	-- <sup>2</sup>	-- <sup>2</sup>	-- <sup>2</sup>	-- <sup>2</sup>	67,503,859
Year 8	-- <sup>2</sup>	-- <sup>2</sup>	43,847,654	-- <sup>4</sup>	-- <sup>2</sup>	-- <sup>2</sup>	-- <sup>2</sup>	-- <sup>2</sup>	43,847,654
Year 9	-- <sup>2</sup>	-- <sup>2</sup>	34,815,744	-- <sup>4</sup>	-- <sup>2</sup>	-- <sup>2</sup>	-- <sup>2</sup>	5,298,048	40,113,792
Total Treated Over Nine Years:									1,366,812,468

1. Based on the average pumping rate and percent operational rate observed during each operational year.
2. Extraction wells EX-1, EXH-3, EX-6, and EX-9 were deactivated (with EPA approval) on June 26, 1997 coincident with implementation of the containment phase of RD/RA.
3. EX-7 was deactivated with EPA approval on November 17, 1998.
4. EX-5A was deactivated with EPA approval on October 9, 2000 as part of an investigation into persistent VOC concentrations near the end of the plume.
5. EX-10 was installed during Year 8. Pumping was initiated at EX-10 during Year 9.

**TABLE 4**

**SUMMARY OF VOCs REMOVED THROUGH NINE YEARS OF OPERATION**

Operational Year	PERC		1,1,1-TCA		TCE		Total VOCs	
	Pounds	Gallons	Pounds	Gallons	Pounds	Gallons	Pounds	Gallons
Year 1	3,017	222.7	902	80.0	367	30.1	4,286	332.8
Year 2	1,178	86.9	273	24.2	99	8.1	1,550	119.3
Year 3	993	73.3	185	16.4	68	5.5	1,246	95.2
Year 4	278	20.5	51	4.5	3	0.2	332	25.3
Year 5	31	2.3	84	7.5	23	1.9	139	11.7
Year 6	46	3.4	34	3.0	20	1.7	101	8.1
Year 7	100	7.4	42	3.7	34	2.8	175	13.8
Year 8	70	5.1	44	3.9	20	1.6	133	10.6
Year 9	37	2.7	21	1.9	8	0.7	67	5.3
Totals:	5,750	424.3	1,637	145.3	643	52.6	8,030	622